

C L A I M S

1. A high-frequency electronic switch comprising:
a signal input terminal to which a high-frequency
signal to be switched is input;

5 a plurality of amplifying circuits with
transistors to respectively amplify the high-frequency
signal to be switched sequentially, the amplifying
circuits being cascade-connected in a plurality of
stages to the signal input terminal;

10 a signal output terminal which is connected to an
output section of an amplifying circuit at final stage
among the plurality of amplifying circuits, and which
outputs the high-frequency signal to be switched
sequentially amplified;

15 a control terminal to which a pulse signal serving
as a switching signal and having a period of a first
level and a period of a second level is input; and

a supply current control circuit which makes the
plurality of amplifying circuits be in an
20 amplification-operational state by supplying
operational current to each of the transistors of the
plurality of amplifying circuits in a period when the
pulse signal input to the control terminal is at the
first level, and which makes the plurality of
25 amplifying circuits be in a non-amplification-
operational state by stopping supplying operational
current to each of the transistors of the plurality of

amplifying circuits in a period when the pulse signal is at the second level,

the high-frequency electronic switch which turns on/off between the signal input terminal and the signal output terminal substantially high-frequency likewise in accordance with a level of the pulse signal input to the control terminal.

2. The high-frequency electronic switch according to claim 1, characterized by comprising:

a positive-phase signal input terminal and a negative-phase signal input terminal which are provided as the signal input terminal, and to which at least one of positive-phase and negative-phase high-frequency signals is input as the high-frequency signal for being switched; and

a positive-phase signal output terminal and a negative-phase signal output terminal which are provided as the signal output terminal, and from which at least one of the positive-phase and negative-phase high-frequency signals is output,

wherein the plurality of amplifying circuits which are cascade-connected in a plurality of stages between the positive-phase signal input terminal and the negative-phase signal input terminal, and between the positive-phase signal output terminal and the negative-phase signal output terminal, are respectively configured to be a differential type with a plurality

of transistors.

3. The high-frequency electronic switch according to claim 1 or 2, characterized in that the supply current control circuit includes a plurality of
5 constant current circuits which are connected to each of the transistors of the plurality of amplifying circuits, and makes the plurality of amplifying circuits be in an amplification-operational state or a non-amplification-operational state simultaneously or
10 virtually simultaneously by making the plurality of constant current circuits be in an operational state or a non-operational state simultaneously or virtually simultaneously in accordance with a level of the pulse signal input to the control terminal.

15 4. The high-frequency electronic switch according to claim 3, characterized in that the high-frequency electronic switch is configured such that the plurality of constant current circuits of the supply current control circuit are respectively composed of a
20 plurality of constant current circuits with transistors, and that the pulse signal input to the control terminal is supplied to each of bases of the transistors of the plurality of constant current circuits.

25 5. The high-frequency electronic switch according to claim 1 or 2, characterized in that the supply current control circuit includes: the plurality of

constant current circuits which are connected to each of the transistors of the plurality of amplifying circuits; and a plurality of delay circuits which provide a delay corresponding to a delay in the high-frequency signal to be switched sequentially amplified in the plurality of amplifying circuits with respect to the pulse signal input to the control terminal, and makes the plurality of constant current circuits be in an operational state or a non-operational state in a timewise staggered manner so as to correspond to the delay in the high-frequency signal in accordance with a level of the pulse signal input to the control terminal.

6. The high-frequency electronic switch according to claim 5, characterized in that the high-frequency electronic switch is configured such that the plurality of constant current circuits of the supply current control circuit are respectively constituted of a plurality of constant current circuits with transistors, and that the pulse signal input to the control terminal is supplied to each of bases of the transistors of the plurality of constant current circuits.

7. The high-frequency electronic switch according to claim 2, characterized by further comprising:

a synthetic circuit which is connected between the positive-phase signal output terminal and the

negative-phase signal output terminal, and which synthesizes and outputs the positive-phase and negative-phase high-frequency signals, serving as the high-frequency signal for being switched, which are sequentially amplified at the plurality of amplifying circuits configured to be a differential type, and are output from the positive-phase signal output terminal and the negative-phase signal output terminal, when positive-phase and negative-phase high-frequency signals are respectively input as the high-frequency signal to be switched to the positive-phase signal input terminal and the negative-phase signal input terminal.

8. A burst wave generating device comprising:
a carrier signal generator which continuously outputs a high-frequency carrier signal; and
a high-frequency electronic switch which outputs the high-frequency carrier signal output from the carrier signal generator in a burst form, or makes it be in an output-stopped state, wherein

the high-frequency electronic switch comprises:
a signal input terminal which receives the high-frequency carrier signal;
a plurality of amplifying circuits with transistors, to respectively amplify the high-frequency carrier signal sequentially, the amplifying circuits being cascade-connected in a plurality of stages to the

signal input terminal;

a signal output terminal which is connected to an output section of an amplifying circuit at final stage among the plurality of amplifying circuits, and which
5 outputs the high-frequency carrier signal to be sequentially amplified;

a control terminal to which a pulse signal serving as a switching signal having a period of a first level and a period of a second level is input; and

10 a supply current control circuit which makes the plurality of amplifying circuits be in an amplification-operational state by supplying operational current to each of the transistors of the plurality of amplifying circuits in a period when the pulse signal input to the control terminal is at the
15 first level, and which makes the plurality of amplifying circuits be in a non-amplification-operational state by stopping supplying operational current to each of the transistors of the plurality of
20 amplifying circuits in a period when the pulse signal is at the second level, and

the high-frequency carrier signal is output in a burst form, or is made to be in an output-stopped state by turning on/off between the signal input terminal and
25 the signal output terminal substantially high-frequency likewise in accordance with a level of the pulse signal input to the control terminal by the high-frequency

electronic switch.

9. The burst wave generating device according to claim 8, characterized by comprising:

5 a positive-phase signal input terminal and a negative-phase signal input terminal which are provided as the signal input terminal of the high-frequency electronic switch, and to which at least one of positive-phase and negative-phase high-frequency carrier signals is input as the high-frequency carrier
10 signal; and

a positive-phase signal output terminal and a negative-phase signal output terminal which are provided as the signal output terminal of the high-frequency electronic switch, and from which at least
15 one of the positive-phase and negative-phase high-frequency carrier signals is output,

wherein the plurality of amplifying circuits which are cascade-connected in a plurality of stages between the positive-phase signal input terminal and the
20 negative-phase signal input terminal, and between the positive-phase signal output terminal and the negative-phase signal output terminal, are respectively configured to be a differential type with a plurality of transistors.

25 10. The burst wave generating device according to claim 8 or 9, characterized in that the supply current control circuit of the high-frequency electronic switch

includes a plurality of constant current circuits which are connected to each of the transistors of the plurality of amplifying circuits, and makes the plurality of amplifying circuits be in an
5 amplification-operational state or a non-amplification-operational state simultaneously or virtually simultaneously by making the plurality of constant current circuits be in an operational state or a non-operational state simultaneously or virtually
10 simultaneously in accordance with a level of the pulse signal input to the control terminal.

11. The burst wave generating device according to claim 10, characterized in that the high-frequency electronic switch is configured such that the plurality
15 of constant current circuits of the supply current control circuit are respectively constituted of a plurality of constant current circuits with transistors, and that the pulse signal input to the control terminal is supplied to each of bases of the
20 transistors of the plurality of constant current circuits.

12. The burst wave generating device according to claim 8 or 9, characterized in that the supply current control circuit of the high-frequency electronic switch
25 includes: a plurality of constant current circuits which are connected to each of the transistors of the plurality of amplifying circuits; and a plurality of

delay circuits which provide a delay corresponding to a delay in the high-frequency carrier signal to be sequentially amplified at the plurality of amplifying circuits with respect to the pulse signal input to the control terminal, and makes the plurality of constant current circuits be in an operational state or a non-operational state in a timewise staggered manner so as to correspond to the delay in the high-frequency carrier signal in accordance with a level of the pulse signal input to the control terminal.

13. The burst wave generating device according to claim 12, characterized in that the high-frequency electronic switch is configured such that the plurality of constant current circuits of the supply current control circuit are respectively constituted of a plurality of constant current circuits with transistors, and that the pulse signal input to the control terminal is supplied to each of bases of the transistors of the plurality of constant current circuits.

14. The burst wave generating device according to claim 9, characterized in that the high-frequency electronic switch further comprises a synthetic circuit which is connected between the positive-phase signal output terminal and the negative-phase signal output terminal, and which synthesizes and outputs the positive-phase and negative-phase high-frequency

carrier signals serving as the high-frequency carrier signal, which are sequentially amplified at the plurality of amplifying circuits configured to be a differential type, and which are output from the positive-phase signal output terminal and the negative-phase signal output terminal when positive-phase and negative-phase high-frequency carrier signals are respectively input as the high-frequency carrier signal to the positive-phase signal input terminal and the negative-phase signal input terminal.

15. A short range radar comprising:

a transmitting unit which has a burst wave generating device including a carrier signal generator which continuously outputs a high-frequency carrier signal in order to emit a short pulse wave with a predetermined width into a space every time a transmission trigger signal is received, and a high-frequency electronic switch which outputs the high-frequency carrier signal output from the carrier signal generator in a burst form, or makes it be in an output-stopped state;

a receiving unit which performs receiving and wave detecting processing onto a reflected wave of the short pulse wave;

a signal processing unit which performs analysis processing on an object existing in the space based on an output from the receiving unit; and

a control unit which performs predetermined control onto at least one of the transmitting unit and the receiving unit based on an analysis result from the signal processing unit, wherein

5 the high-frequency electronic switch of the burst wave generating device comprises:

 a signal input terminal which receives the high-frequency carrier signal;

 a plurality of amplifying circuits with
10 transistors, to respectively amplify the high-frequency carrier signal sequentially, the amplifying circuits being cascade-connected in a plurality of stages to the signal input terminal;

 a signal output terminal which is connected to an
15 output section of an amplifying circuit at final stage among the plurality of amplifying circuits, and which outputs the high-frequency carrier signal to be sequentially amplified;

 a control terminal to which a pulse signal serving
20 as a switching signal having a period of a first level and a period of a second level is input; and

 a supply current control circuit which makes the plurality of amplifying circuits be in an amplification-operational state by supplying
25 operational current to each of the transistors of the plurality of amplifying circuits in a period when the pulse signal input to the control terminal is at the

first level, and which makes the plurality of amplifying circuits be in a non-amplification-operational state by stopping supplying operational current to each of the transistors of the plurality of amplifying circuits in a period when the pulse signal
5 is at the second level, and

the high-frequency carrier signal is output in a burst form, or is made to be in an output-stopped state by turning on/off between the signal input terminal and
10 the signal output terminal substantially high-frequency likewise in accordance with a level of the pulse signal input to the control terminal by the high-frequency electronic switch.

16. The short range radar according to claim 15,
15 characterized by comprising:

a positive-phase signal input terminal and a negative-phase signal input terminal which are provided as the signal input terminal of the high-frequency electronic switch, and to which at least one of
20 positive-phase and negative-phase high-frequency carrier signals is input as the high-frequency carrier signal; and

a positive-phase signal output terminal and a negative-phase signal output terminal which are
25 provided as the signal output terminal of the high-frequency electronic switch, and from which at least one of the positive-phase and negative-phase

high-frequency carrier signals is output,

wherein the plurality of amplifying circuits which are cascade-connected in a plurality of stages between the positive-phase signal input terminal and the negative-phase signal input terminal, and between the positive-phase signal output terminal and the negative-phase signal output terminal, are respectively configured to be a differential type with a plurality of transistors.

17. The short range radar according to claim 15 or 16, characterized in that the supply current control circuit of the high-frequency electronic switch includes a plurality of constant current circuits which are connected to each of the transistors of the plurality of amplifying circuits, and makes the plurality of amplifying circuits be in an amplification-operational state or a non-amplification-operational state simultaneously or virtually simultaneously by making the plurality of constant current circuits be in an operational state or a non-operational state simultaneously or virtually simultaneously in accordance with a level of the pulse signal input to the control terminal.

18. The short range radar according to claim 17, characterized in that the high-frequency electronic switch is configured such that the plurality of constant current circuits of the supply current control

circuit are respectively constituted of a plurality of constant current circuits with transistors, and the pulse signal input to the control terminal is supplied to each of bases of the transistors of the plurality of constant current circuits.

19. The short range radar according to claim 15 or 16, characterized in that the supply current control circuit of the high-frequency electronic switch includes: a plurality of constant current circuits which are connected to each of the transistors of the plurality of amplifying circuits; and a plurality of delay circuits which provide a delay corresponding to a delay in the high-frequency carrier signal to be sequentially amplified at the plurality of amplifying circuits with respect to the pulse signal input to the control terminal, and makes the plurality of constant current circuits be in an operational state or a non-operational state in a timewise staggered manner so as to correspond to the delay in the high-frequency carrier signal in accordance with a level of the pulse signal input to the control terminal.

20. The short range radar according to claim 19, characterized in that the high-frequency electronic switch is configured such that the plurality of constant current circuits of the supply current control circuit are respectively constituted of a plurality of constant current circuits with transistors, and that

the pulse signal input to the control terminal is supplied to each of bases of the transistors of the plurality of constant current circuits.

21. The short range radar according to claim 16,
5 characterized in that the high-frequency electronic switch further comprises a synthetic circuit which is connected between the positive-phase signal output terminal and the negative-phase signal output terminal, and which synthesizes and outputs the positive-phase
10 and negative-phase high-frequency carrier signals serving as the high-frequency carrier signal, which are sequentially amplified at the plurality of amplifying circuits configured to be a differential type, and which are output from the positive-phase signal output
15 terminal and the negative-phase signal output terminal when positive-phase and negative-phase high-frequency carrier signals are respectively input as the high-frequency carrier signal to the positive-phase signal input terminal and the negative-phase signal input
20 terminal.